PALM-SIZED HANDHELD DEVICE WITH INVERTED ERGONOMIC KEYPAD

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the field of handheld digital devices. More specifically, the present invention relates to the placement of data entry keys with respect to the display within each of these devices.

2. Background Information

Advances in computer and telecommunication technology have led to the wide spread adoption and miniaturization of electronic organization and communication devices, such as personal digital assistants (PDAs) and wireless pagers. Although smaller versions of such devices allow increased portability, the reduction in size is typically accompanied by awkward keypad positioning thereby hindering one's ease of use and possibly causing discomfort to the user.

FIG. **1** illustrates an exemplary prior art PDA. As illustrated, prior art PDA **100** typically includes body-casing **116** with top end **118**A, bottom end **118**B, left side **119**A and right side **119**B, as well as keypad **102**, disposed near bottom end **118**B. Keypad **102** represents a set of small, fingertip-sized data entry keys configured in a standard "QWERTY" arrangement to facilitate a user in providing numeric and/or alphanumeric input into PDA **100**. Keypad **102** further includes function keys **120–121**, which are linked to pre-programmed functions such as character mode and/or operating mode switching activated by the press of the appropriate function keys **120–121** by a user.

PDA **100** further includes display screen **108**, which is disposed near top end **118**A above keypad **102**, and is used to echo numeric or alphanumeric inputs entered by a user, as well as to display various graphical and/or alphanumeric messages, menu options, control information, status information, and so forth. For example, display screen **108** is illustrated as displaying graphical icons **110–114**, and date and time information **104**.

Although the physical size of body casing **116** may vary, PDA **100** is typically palm-sized so as to fit within the palm of an average user's hand. During normal use, by virtue of its configuration with keypad **102** disposed near bottom end **118**B and display screen **108** disposed near top end **118**A above keypad **102**, a user will typically rest body casing **116** on one or both of their index fingers formed into an arch with at least one of the user's thumbs being utilized to pinch PDA **100** against the arched forefinger(s), thus leaving only one of the users thumb free to enter and/or manipulate data via keypad **102**. Accordingly, the user typically severely arches their thumbs into an inconvenient and uncomfortable position in order to operate PDA **100**, thereby exposing the user to possible discomfort. Furthermore, due to keypad **102** being disposed below display screen **108**, display screen **108** is rendered vulnerable to bright light sources such as the sun. In situations where display screen **108** represents a backlit display for example, such bright light shone on display screen **108** can severely interfere with the users viewing of information displayed within display screen **108**.

Therefore, a more user-friendly design, in particular, one that improves thumb manipulability of the keypad is desired.

SUMMARY OF THE INVENTION

A palm-sized handheld device includes a body casing having a top end and a bottom end. In accordance with one embodiment of the invention, the device also includes a display screen proximately disposed near the bottom end of the device, and a plurality of input keys proximately disposed near said top end of the device above the input display screen.

As a result of such a configuration, accessibility to the input keys by users' thumbs is improved while glare from a bright light source on the display screen may be decreased.

BRIEF DESCRIPTION OF DRAWINGS

The present invention will be described by way of exemplary embodiments, but not limitations, illustrated in the accompanying drawings in which like references denote similar elements, and in which:

FIG. **1** illustrates a typical prior art PDA;

FIG. **2** illustrates a PDA of the present invention incorporated with a keypad disposed above the display, in accordance with one embodiment;

FIG. **3** further illustrates PDA **200** of FIG. **2**, incorporated with the teachings of the present invention, in accordance with one embodiment;

FIG. **4** illustrates a PDA incorporating various advantageous aspects of the present invention, in accordance with a second embodiment; and

FIGS. **5**A–**5**E illustrate a PDA incorporating various advantageous aspects of the present invention, in accordance with a third embodiment.

DETAILED DESCRIPTION OF THE INVENTION

In the following description, various aspects of the present invention will be described. However, it will be apparent to those skilled in the art that the present invention may be practiced with only some or all aspects of the present invention. For purposes of explanation, specific numbers, materials and configurations are set forth in order to provide a thorough understanding of the present invention. However, it will also be apparent to one skilled in the art that the present invention may be practiced without the specific details. In other instances, well known features are omitted or simplified in order not to obscure the present invention. The phrase "in one embodiment" will be used repeatedly, however the phrase does not necessarily refer to the same embodiment, although it may.

Referring now to FIG. **2**, wherein a front view of a personal digital assistant (PDA) **200**, incorporated with the teachings of the present invention in accordance with one embodiment, is shown. PDA **200** includes body casing **216** having a top end **218**A, a bottom end **218**B, a left side **219**A, a right side **219**B, display screen **208**, left key set **202**A and right key set **202**B. Except for the teachings of the present invention, each of these elements is used to provide the same functionality as the functionality provided by the corre-